

# Tincher Special Area

## Hoosier National Forest

January 8, 2002

### General

The Tincher Special Area is 4,180 acres in size and is located on the Lost River District of the Hoosier National Forest. This is the largest special area located on the Hoosier National Forest. The Tincher area was designated as a special area due to the karst geology that is present in the area. The following description of the area is from the Hoosier National Forest Land and Resource Management Plan, Plan Amendment #5:

The main features of this area are its karst formations. There are many sinkholes, swallow holes, and caves. A fault in the Tincher Pond area exposes a conglomerate, which is not commonly seen exposed on the Forest. Preliminary fieldwork on an ecological classification system has identified some soils/geology differences that are likely to lead to the identification of plant communities not found elsewhere on the Forest.

A management plan was written and approved for the Tincher Special Area in November 1995. A copy of that management plan is included. The management plan contains information on the existing condition, desired future condition, and management practices for the following resource areas: karst/geology, ecosystem, heritage, visual resource, recreation and interpretation, landbase, and human and community development.

### Cave Fauna

Cave biologist Dr. Julian Lewis is currently surveying the Tincher cave fauna in addition to other caves/karst areas across the forest. Dr. Lewis started his bioinventory in July 2000. Based on the inventory being conducted by Dr. Lewis and information from the Indiana Department of Natural Resources, Division of Nature Preserves, the following is a list of the currently known cave fauna inhabiting the Tincher cave system with scientific/common names and a brief description of the species. All of the species in the list are troglobites, obligate subterranean organisms found only in caves/groundwater.

#### *Ambylopsis spelaea* (Northern cavefish)

Global rank G3 vulnerable and state rank S3 vulnerable, Regional Forester's Sensitive Species (RFSS). This species is only found in south-central Indiana and north-central Kentucky.

#### *Sphalloplana weingartneri* (Weingartner's cave flatworm)

Global rank G2 imperiled and state rank S2 imperiled. Prior to Dr. Lewis' study, this species was not known to occur on the Hoosier National Forest. This species is endemic to southern Indiana, having been found only in caves from the Ohio River to the East Fork of the White River.

#### *Caecidotea stygia* (Northern cave isopod)

Global rank G5 secure and state rank S4 apparently secure. This species is ubiquitous in Indiana caves and occurs from Ohio to eastern Missouri and south to the Mammoth Cave region in Kentucky.

#### *Crangonyx packardii* (Packard's groundwater amphipod)

Global rank G3 vulnerable and state rank S3 vulnerable, Regional Forester's Sensitive Species (RFSS). This species occurs in groundwater habitats from Indiana to Kansas.

#### *Orconectes inermis* (Northern cave crayfish)

Global rank G3 vulnerable and state rank S3 vulnerable, Regional Forester's Sensitive Species (RFSS). This species is an obligate cavernicole known from southern Indiana and north-central Kentucky.

*Conotyla bollmani* (Bollman's cave milliped)

Global rank G3 vulnerable and state rank S3 vulnerable, Regional Forester's Sensitive Species (RFSS). This species is endemic to southern Indiana.

*Phanetta subterranea* (Subterranean sheet-web spider)

Global rank G5 secure and state rank S4 apparently secure. This spider is nearly ubiquitous in Indiana caves. This species occurs from Pennsylvania south to Alabama and west to Missouri.

*Porromma cavernicolus* (Cavernicolus sheet-web spider)

Global rank G3 vulnerable and state rank S2 imperiled, Regional Forester's Sensitive Species (RFSS). In Indiana this species is known only from caves along the East Fork of the White River drainage, where it is rarely encountered despite many seemingly suitable caves.

*Oreonitides undescribed species* (Undescribed sheet-web spider)

Global rank G1 critically imperiled and state rank S1 critically imperiled. This is a newly discovered species found by Dr. Lewis during his inventory work on the Hoosier National Forest. This species is currently known only from the Tincher area and Big Oaks National Wildlife Refuge. It is endemic to south-central Indiana.

*Apochthonius indianensis* (Indiana cave pseudoscorpion)

Global rank G1 critically imperiled and state rank S1 critically imperiled. Prior to Dr. Lewis' study, this species was not known to occur on the Hoosier National Forest. This pseudoscorpion is known only from the Tincher area and three other caves in Lawrence and Orange counties of Indiana.

*Onychiurus undescribed species* (Undescribed cave springtail)

Global rank G1 critically imperiled and state rank S1 critically imperiled. This is a newly discovered species found by Dr. Lewis during his inventory work on the Hoosier National Forest. This species is currently known only from the Tincher area and Martin County and is endemic to the East Fork of the White River drainage.

*Pseudosinella fonsa* (Fountain cave springtail)

Global rank G2 imperiled and state rank S2 imperiled, Regional Forester's Sensitive Species (RFSS). This species range extends from south-central Indiana to southeastern Ohio.

*Pseudosinella undescribed species* (Undescribed cave springtail)

Global rank G1 critically imperiled and state rank S1 critically imperiled. This is a newly discovered species found by Dr. Lewis during his inventory work on the Hoosier National Forest. This species is currently known only from the Tincher area and is probably a Tincher endemic.

*Sinella alata* (Indiana cave springtail)

Global rank G3 vulnerable and state rank S3 vulnerable, Regional Forester's Sensitive Species (RFSS). This species is endemic to Indiana, where it has been found in both the south-central and southeastern karst belts.

*Pseudanophthalmus stricticollis* (Marengo Cave ground beetle)

Global rank G3 vulnerable and state rank S2 imperiled, Regional Forester's Sensitive Species (RFSS). This species is an obligate subterranean ground beetle endemic to the south-central karst of southern Indiana, where it has been reported from more than 30 caves.

*Pseudanophthalmus youngi* (Young's Cave ground beetle)

Global rank G2 imperiled and state rank S2 imperiled, Regional Forester's Sensitive Species (RFSS). The Young's Cave ground beetle is endemic to the south-central Indiana karst.

*Spelobia tenebrarum* (Cave dung fly)

Global rank G5 secure and state rank S5 secure. This species is ubiquitous in Indiana caves and is known from Arkansas to New York.

Global/state ranks: G1/S1 – species that have been recorded from 1-5 localities; G2/S2 – species that have been recorded from between 6-20 localities; G3/S3 – species that have been recorded

from between 21-100 localities; G4/S4 – species that have been recorded from more than 100 localities; and G5/S5 – species that are widespread and common from many localities.

In regards to cave fauna, the Tincher Special Area is one of most significant karst areas in the state of Indiana. This area has 17 known troglobitic species. Areas that contain 20 or more known troglobites are considered to be global subterranean hotspots. There are only five locations in Indiana that contain 15 or more troglobitic species; they are Marengo Cave system, Binkley Cave System, Lost River System, Wyandotte Cave System and the Tincher Special Area.

Dr. Lewis is continuing to conduct surveys in the Tincher area as only approximately half of the area has been surveyed. Several habitat types have not yet been surveyed, including the base-level river habitat, and Dr. Lewis anticipates finding additional troglobitic species in those habitats.

### *Bats*

During Dr. Julian Lewis' bioinventory work in the Tincher Special Area, he has noted the presence of numerous bats in the caves and karst features. At this point, none of the bats have been identified as the federally endangered Indiana bat, but there is potential for this species to occur within the area.

The Tincher area contains the old Gardner Mine and Pennsylvania Salt Company workings. The Gardner Mine passages are known to house bats. Bat surveys have been conducted at the entrances to the mines since 1999 and will continue in 2002. Several bat species were recorded using the mines, however, Indiana bats were absent.

There is an Indiana bat hibernaculum located in Martin County approximately five miles from the Tincher Special Area. This hibernaculum was confirmed during the 2001 Indiana bat census. The Tincher area could provide foraging and roosting habitat for the Indiana bat.

### *Potential Threats (Summarized from a report by Dr. Julian Lewis on RFSS cave species)*

Since cave fauna are located in a restricted cave environment, they are susceptible to a wide variety of disturbances. Caves are underground drainage conduits for surface runoff, bringing in significant quantities of nutrients for cave communities. Unfortunately, contaminants may be introduced with equal ease, with devastating effects on cave animals. Potential contaminants include pesticides or herbicides used for crops, livestock, trails, roads or other applications and hazardous material introductions via accidental spills or deliberate dumping, including road salting.

Habitat alteration due to sedimentation is a pervasive threat potentially caused by logging, road or other construction, trail building, farming, or any other kind of development that disturbs groundcover. Sedimentation potentially changes cave habitat, blocks recharge sites, or alters flow volume and velocity.

### **Regional Forester's Sensitive Species**

On February 29, 2000, the Regional Forester for the Eastern Region of the Forest Service approved an update of the Regional Forester's Sensitive Species (RFSS) list. That list contains 78 sensitive species have been documented to occur on the Hoosier National Forest. Sensitive species are plant and animal species for which population viability is recognized as a concern, as evidenced by a downward trend in population or habitat capability. In this case, "concern" or "downward trend" are inferred when the species: (1) is considered globally imperiled by The Nature Conservancy and Association for Biodiversity Information, or (2) is tracked by state natural resource agencies and natural heritage programs, Biological Resource Division of the US Department of Interior Geological Survey, professional societies, or conservation organizations.

Of the 78 species on the current RFSS list, 20 are associated with caves and karst features, ten of which are currently known to occur within the Tincher area. In addition to the cave species, there are two Regional Forester's sensitive plant species and one animal known to occur in the Tincher Special Area and there is suitable habitat for others. The species known to occur in the area are:

*Bacopa rotundifolia* (Round-leaf water hyssop)

This species is listed as endangered by the state of Indiana. It is a perennial herb of wet soil and pond margins which flowers during the summer. It ranges throughout much of the central United States. One population of this species is known within the Forest boundary. It is located on a pond margin. This was the second known extant population in the state.

*Eupatorium album* (White Thoroughwort)

This species is listed as endangered by the state of Indiana. It is a perennial herb, which grows in open forests. This species ranges mostly in the Coastal Plain and mountainous parts of the eastern United States. There are four known sites for this species on the forest.

*Lynx rufus* (Bobcat)

This species is listed as endangered by the state of Indiana. It is a wide-ranging predator requiring a diversity of habitat within its home range. This species needs secluded areas and requires dense brush or rocky outcrops for cover. The bobcat has been widely found across the Forest. It is a low-density species and is very secretive.

## Karst Features

The Tincher Special Area is an exciting place from a karst standpoint. Virtually the entire area is subterranean drained and comprised of active and extensive karst, including caves, pits, sinkholes, swallow holes, cave springs and the longest free-drop pit in Indiana. The Hoosier National Forest considered the area to be significant enough that we designated it as the largest special area on the forest.

Special areas are managed to emphasize the protection, perpetuation, or restoration of their special features and values. Management within these areas is also done for Federally listed threatened, endangered, proposed, Regional Forester's sensitive, and state-listed species if the species or habitat exists or has the potential to exist. The karst features within the Tincher area are well described in the Tincher Special Area management plan.

## Summary

To summarize, the Tincher Special Area is the largest special area on the Hoosier National Forest; and it is replete with karst features, including, caves, sinkholes, and springs. The area contains 17 known troglobitic species, 14 of which are ranked G3 or higher. Most of those species are endemic to south-central Indiana and one of which is only known from the Tincher area. The area contains records for 13 Regional Forester's sensitive species and potential habitat for the federally endangered Indiana bat. Due to the uniqueness of the area and sensitivity of karst habitats, there is high potential for impacts from road construction.

**TINCHER KARST SPECIAL AREA**  
**Special Area Management Plan**



# TINCHER KARST SPECIAL AREA


## Special Area Management Plan

**TYPE: Karst Geology**

**GENERAL DESCRIPTION:** The main feature of this area is its karst formations. The area contains many sinkholes, swallow holes and caves. The Bryantsville Breccia conglomerate was first discovered and named in this area (type location). Notable plant and animal communities have been identified.

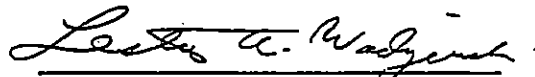
**FOREST PLAN DIRECTION:** This plan will expand on the evaluation report and include more specifics on the area's ecological and use potential, as well as specific management needed to achieve the desired future condition. Periodical and sequential treatments will be outlined, and definite boundaries drawn. Monitoring steps will be identified to evaluate management of the area.

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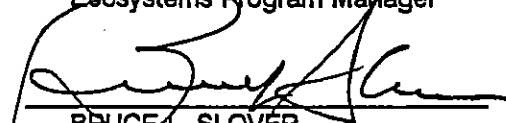
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# **TINCHER KARST SPECIAL AREA MANAGEMENT PLAN**

## **LOCATION AND BOUNDARIES**

The Tinch Hollow and Tinch Pond areas are managed as one combined Special Area. It is located on the Lost River Unit of the Brownstown Ranger District, Hoosier National Forest, in Spice Valley Township in southwestern Lawrence County, Indiana (see attached map). The area totals 4,305 acres of National Forest System land.

Existing boundaries for this Special Area as delineated in the Forest Plan are depicted on Map A, Appendix 1. The desired boundaries for this Special Area are depicted on Map B in Appendix 1 and include lands currently designated in the Forest Plan as Management Area 2.8 (general forest).

## **EXISTING CONDITION**

This section summarizes the present environmental conditions of the Tinch Karst Special Area, MA 8.2.

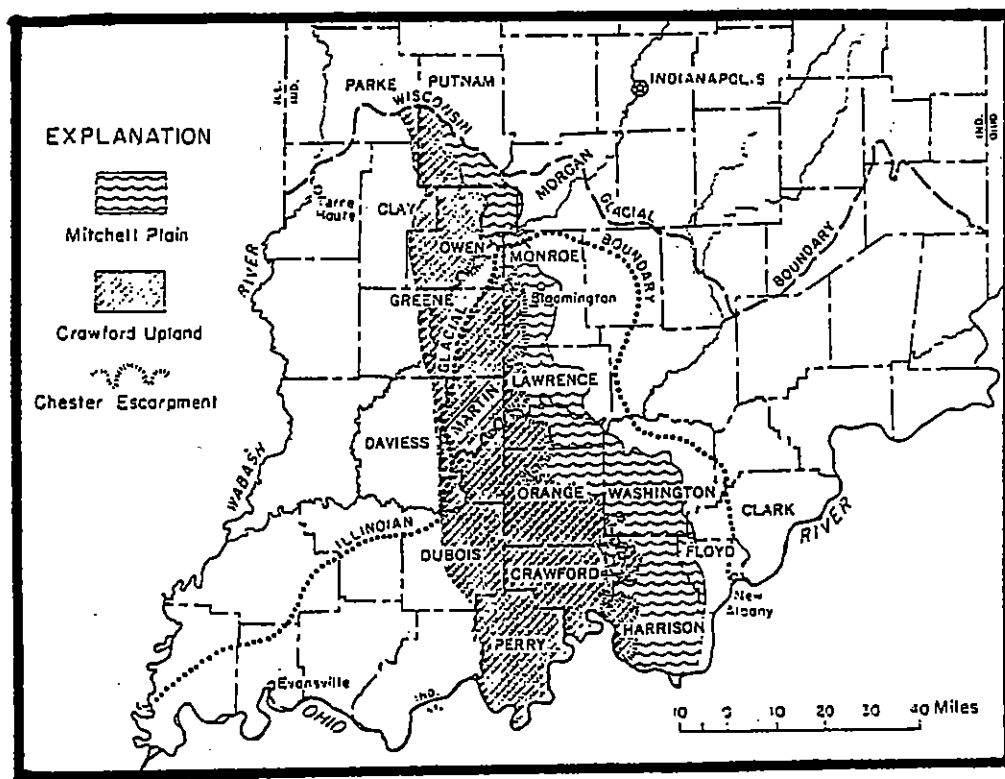
### **KARST/GEOLOGY**

#### **Landscape**

The landscape within this Special Area is characterized by sinkholes, sinking streams, and caves. Such a landscape is called "karst topography." The term is derived from an area in northwestern (former) Yugoslavia, called the Carso Plateau, where karst features have their most extensive and complex development (Powell, 1961).

The Tinch Karst Special Area is within the Crawford Upland and Chester Escarpment Physiographic units. The Crawford Upland is a hilly, roughly dissected upland formed upon the upper Mississippian and Pennsylvanian shales, sandstones and limestones. The Beaver Bend, Reelsville, Beech Creek, Galconda, and Glen Dean limestones crop out in the upland. The Mitchell Plain and the Crawford Upland are separated by an eastward-facing escarpment called the Chester Escarpment. This Escarpment separates the resistant sandstones in the upland and the more easily eroded limestones in the plain (Powell, 1961).

Most of Indiana's larger caverns are associated with the east edge of the Crawford Upland [Chester Escarpment] (Powell, 1961). This is also the zone where Indiana's deepest and largest pits can be found. The vast majority of Indiana's caves occur in the limestones of the Blue River group. The overlying sandstones and shales preserve these limestones from surface erosion and permit more extensive formation of subterranean features, such as pits, caves and conduits.



Map of Indiana showing Mitchell Plain and Crawford Upland physiographic units.  
(Modified from Malott, 1922)

## ***Stratigraphy***

The position of the karst features developed in the limestone bedrock formations is a result of erosional weathering of the host sedimentary rocks. Rock unit stratigraphy names the sedimentary formational units and describes their compositional and textural features as well as their characteristic features such as bedding, fracturing, and boundaries with adjacent formations. This information is essential to describing the position of karst features and for investigating the relation of the karst drainage systems, their interconnection and modification over time as erosion continues (Connor, 1994).

The rock units in this area range from the Mansfield formation at the bottom of the Pennsylvanian age rocks to the Saint Genevieve limestone in the lowest exposures found in the valley bottoms (see table). The significance of Tincher Karst Special Area lies in the multitude of surface karst features; i.e., sinkholes, pits, caves, karst springs, drybeds, blind valleys, rises, conduits and other features which are manifest in this small area. By far, the vast majority of these features demonstrate their most extensive development in the Blue River group, which includes the Paoli and Saint Genevieve limestones. Some karst features may also be found in the West Baden and Stephensport limestones; i.e., Beech Creek, Reelsville and Beaver Bend limestones.

The strata above the West Baden group have been eroded away to varying degrees in a zone termed the Pre-pennsylvanian unconformity. Therefore, it is possible to have Pennsylvanian age Mansfield formation rocks occurring just above the Beech Creek limestone for example (Connor, 1994).

The local bedrock dip is toward the southwest, with the strike bearing southeast/northwest. The Mississippian age bedrock dips at about 35 feet per mile.

(See diagram of general stratigraphic column for paleozoic rocks on page 7.)

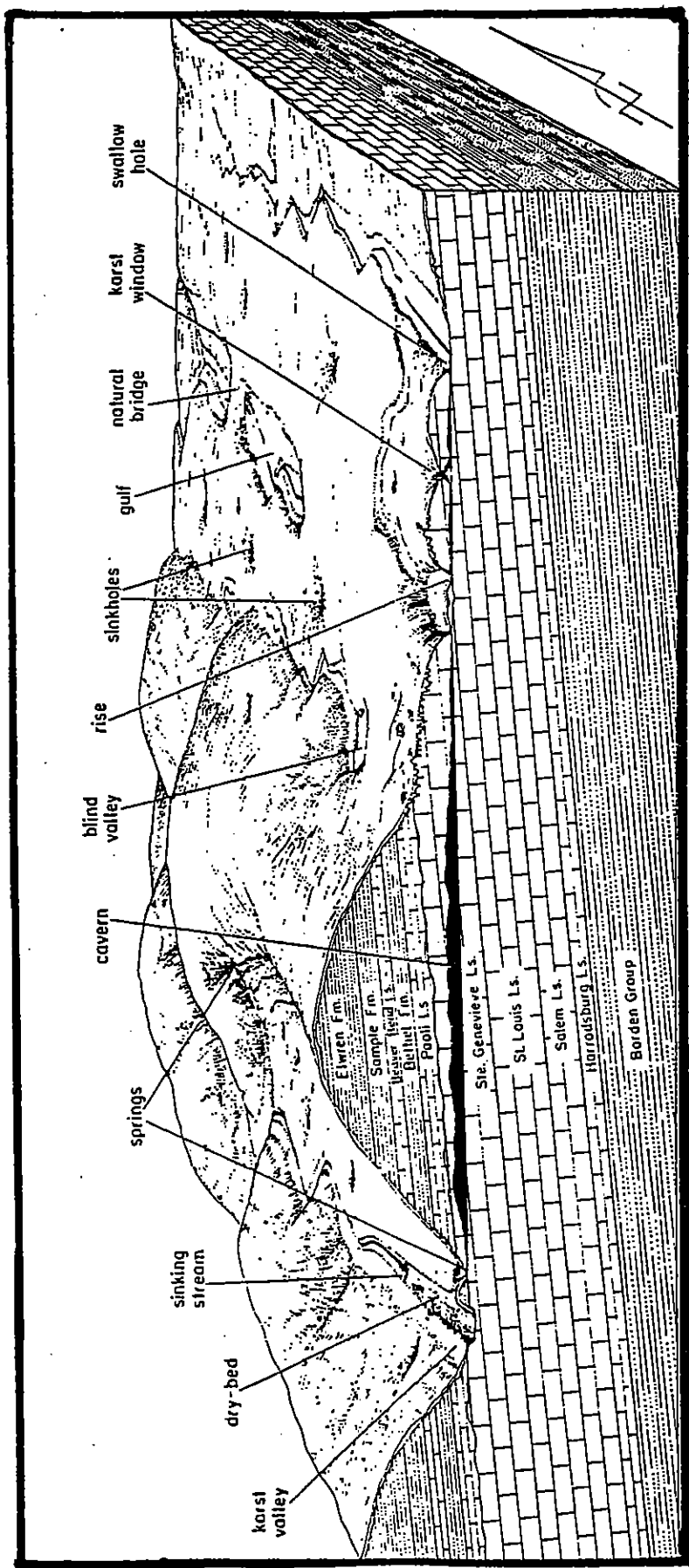
## ***Karst Hydrology***

Virtually all of this Special Area is subterranean-drained. Surface drainage is handled by sinking streams that flow a short distance across the upper level sandstones and shales before disappearing into a subterranean channel. Dye tracing has demonstrated that Burton Hollow drains into Blind Fish Spring, four miles away. This suggests that reports of a dye trace from Mrs. Carroll's Cave (seven miles away) may be correct, and that both Tincher Valley and Tincher Pond drainage basins as well as surrounding areas are the recharge basins for Blind Fish Spring. Blind Fish Spring contains blind fish; therefore, ground water contamination must be carefully guarded against since the consequences to these fish and other subterranean biota could be severe.

(See block diagram on page 8 showing karst features of the Crawford Upland and the Mitchell Plain.)

General Stratigraphic Column  
for Paleozoic Rocks in  
Indiana (Adapted from  
Indiana Geological Survey  
Bulletin 59, 1986)

PERIOD	EPOCH	THICKNESS (FT)*	LITHOLOGY	ROCK UNIT		
				SIGNIFICANT MEMBER	FORMATION	GROUP
P E N N S Y L V A N I A N	MISSOURIAN	170 to 770		Merom Ss.	Mattoon	McLeansboro
				Livingston Ls.	Bond	
				Carthage Ls.	Patoka	
				Vigo Ls.		
				West Franklin Ls.	Shelburn	
	DESMOINESIAN	290 to 460		Danville Coal	Dugger	Carbondale
				Hymers Coal		
				Alum Cave Ls.		
				Springfield Coal	Petersburg	
				Survant Coal		
P E N N S Y L V A N I A N	ATOKAN	160 to 980		Seelyville Coal	Staunton	Raccoon Creek
				Perth Ls.		
				Minshall Coal	Brazil	
				Lower Block Coal		
				Lead Creek Ls.	Mansfield	
M I S S I S S I P P I A N	CHESTERIAN	160 to 375		SW IND ONLY	Grove Cr. Sn	Buffalo Wallow
				Negh Creek Ls.	Kinkaid Ls.	
					Degonia Ss.	
					Clore Ls.	
					Palestine Ss.	
				Sibena Ls.	Menard Ls.	
				Leopold Ls.	Waltersburg Ss.	
					Branchville	
				Vienna Ls.	Vienna Ls.	
					Tar Springs	
	CHESTERIAN	130 to 240			Glen Dean Ls.	Stephens- port
					Hardinsburg	
					Haney Ls.	
					Big Clifty	
					Beech Creek Ls.	
	CHESTERIAN	100 to 260			Cypress	West Baden
					Elwren	
					Reelsville Ls.	
					Sample	
					Beaver Bend Ls.	
M I S S I S S I P P I A N	VALMEYERAN	40 to 660		Levias	Renault	Blue River
					Aux Vases	
				Spar Mountain	St. Genevieve Ls.	
				Fredonia		
					St. Louis Ls.	
	VALMEYERAN	130 to 910			Salem Ls.	Sanders
					Harrodsburg Ls.	
					Muldrough	
					Ramp Creek	
					Edwardsville	
M I S S I S S I P P I A N	KINDERHOOGAN	25 to 760		Floyds Knob Ls.	Sackert Knob	Borden
					New Providence Sh	
					Rockford Ls.	
					Coldwater Sh	
					Sunbury Sh	



Idealized block diagram showing some karst features of the Crawford Upland (on left) and the Mitchell Plain (right). Block represents a 2 mile distance. Modified from Wayne, 1950.

### ***Caves and Karst Features***

There are 15 known caves and over 92 other karst features located on National Forest System (NFS) lands within this Special Area. Within the Special Area boundary, on both public and private land, there are a total of 65 known caves and a multitude of other karst features. There is considerable potential for significant new discoveries in the Special Area. Among the most notable known features on NFS lands are:

<b><i>Name</i></b>	<b><i>Description</i></b>
Fuzzy Hole	Large collapse sinkhole.
Crystal Falls Cave	Interconnecting series of domes.
TRAC Cave	200-ft. cave with two small rooms leading to an extensive crawl. The entrance is in a large sinkhole.
Tincher Valley Cave	Large sinkhole entrance in limestone, 100-ft. long.
Gory Hole	Longest free drop (142-ft.) pit in Indiana.
Burton Hollow Cave	Fragile formations, subject to flooding, 12-ft. long.
Turtle Plunge	40-ft. pit leading into an interconnecting series of domes, 150-ft. long.
Tincher Swallow Hole	Major swallow hole and drain for the northern-most branch of Tincher Valley.
Triple Sinks	A small spring runs into one sink, running water can be heard at the bottom sink, and the third sink is generally dry.
Burton Swallowhole	50-ft. deep depression. Small cave may wash open from time to time.

A more extensive list of caves and karst features is contained in the appendix.



Chart showing number of known caves by formation in Indiana.

System	Series	Formation	Average thickness (feet)	Number of known caves
Mississippian	Chester	Glen Dean Limestone	40	5
		Hardinsburg Formation	35	
		Golconda Formation	40	3
		Big Clifty Formation	35	
		Beech Creek Limestone	15	31
		Elwren Formation	40	
		Reelsville Limestone	5	
		Sample Formation	25	
		Beaver Bend Limestone	15	2
		Bethel Formation	20	
		Paoli Limestone	25	4
	Meramec	Ste. Genevieve Limestone	100	88
				106
				13
		St. Louis Limestone	100	67
		Salem Limestone	40	32
	Osage	Harrodsburg Limestone	70	39
				4
				4

### Endellite (Clay) Deposits

The old Gardner Mine and Pennsylvania Salt Co. workings are located at, or slightly above, the Mansfield unconformity. The bodies of clay under Gardner Mine Ridge occur at the erosional contact of the Pennsylvanian Mansfield sandstone with the underlying Mississippian formations of the Chester group. They may also occur as cavity fillings within the sandstone a few feet above the contact.

## **ECOSYSTEM**

### **Landscape Setting**

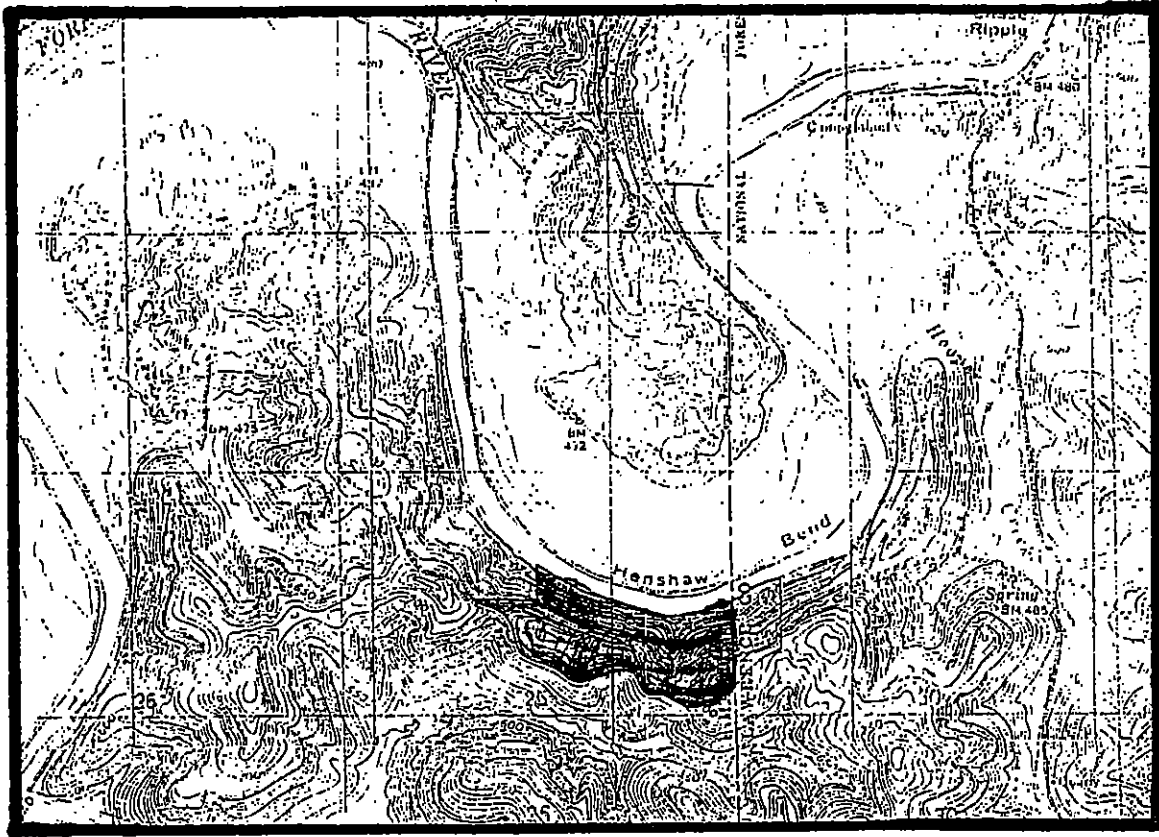
The Tincher Karst Special Area is located in the northeast portion of Opportunity Area (OA) 9 on the Lost River Unit of the Brownstown Ranger District. The OA 9 analysis provided the information for much of this report.

The area is mostly forested with steep slopes and rocky outcrops. Landscape features include forest, small openings, fishing ponds, old cemeteries, roads, structures and fields. Private land use includes pasture and cropland, home sites, churches, stores and small towns. The Tincher area is recognized for its geological values as a unique example of upland karst. A core area of solid National Forest System land with 286 acres of mature forest is identified in the Tincher Area. This mature forest area has the potential for development of old growth. For all of these reasons, the Tincher area was recognized as a Special Area during the Forest planning process.

### **Plant and Animal Communities**

Forest communities in the area range from chestnut, scarlet, and black oak on the drier ridgetops and south aspects to mixed oak and beech-maple in moist areas such as ravines, coves and lower slopes. Stands of tulip poplar are interspersed with these on more mesic sites. Non-native pines are in fairly pure stands as well as mixed with hardwoods. These stands are remnants from erosion control plantings in the 1930's and 40's and vary in size and vigor. On a recent visit to the Tincher area it was observed that the stands previously dominated by oak or mixed conifer were undergoing succession toward late seral, shade-tolerant species, particularly beech and maple. Non-agricultural forest openings are rapidly reverting to forest except where they have been intentionally maintained. The current mix of agricultural lands and early, mid and late successional forest provides diverse habitat for many plant and animal species.

A portion of the Martin State Forest near Henshaw Bend on the White River is proposed as a State Nature Preserve. An adjacent small (15-20 acre) portion of National Forest System lands provides similar values: old-growth, and undisturbed forest with scenic views of the forest, river and surrounding landscape. This tract would benefit from inclusion in the Tincher Karst Special Area.



Department of Natural Resources Nature Preserve at Henshaw Bend (shown in blue), and adjacent National Forest System land (in yellow)

The dry, open oak woodlands are habitat for species such as the worm-eating warbler, pileated woodpecker, broadwinged hawk, five-lined and broadheaded skinks, woodland vole and short-tailed shrew. Moist forest communities provide habitat for species such as the rufous-sided towhee, red-shouldered hawk, salamanders, frogs and a variety of flycatchers. Early successional, shrub dominated habitats are utilized by species like wild turkey, bobwhite quail, whitetail deer, bobcat and a variety of songbirds such as the blue-winged warbler and the yellow-breasted chat.

Open lands, dominated by herbaceous cover, support many species adapted to utilizing forest edge. They are also favored by grassland dwellers such as Henslow's and Bachman's sparrow, red-tailed hawk, meadow lark, woodchuck, red fox and several species of mouse and vole.

Within this landscape the Forest Service is maintaining 16 acres of forest openings which provide early seral shrub dominated habitats. Agricultural lands provide most of the herbaceous open land habitat.

## Federally-listed Threatened and Endangered Species, Regional Sensitive Species and Forest Species of Concern

The landscape in which the Tincher Karst Special Area is situated is home to a number of threatened, endangered and sensitive species and Forest species of concern (FSOCs). A list and map are provided in the OA 9 analysis report (USDA, Forest Service 1994).

Consultation with the IDNR Division of Nature Preserves has provided information on species found within the Tincher Karst Special Area. They also have an ongoing survey which will provide better maps and an updated list by late spring or summer 1996. This study should be used when planning management activities in the area.

The northern cave fish, *Amblyopsis spelaea*, is found in subterranean waters in the area. Its locations in the cave system have not been fully determined.

There have been sightings of bobcats, *Felis rufus*, in the area. They utilize all forest types but are drawn to openings and early successional forest to forage.

There are a number of plant FSOCs in the Tincher area. Populations of the following species have been documented, and survey work is ongoing:

*Bacopa rotundifolia*, roundleaf water hyssop, found in shallow water or very wet soil.

*Panicum Bicknellii* and *Panicum Yadkinense*, panic grasses, found on moist woodland soils.

*Lespedeza Nuttallii*, Nuttall's bushclover, found on dry ridges.

*Aster undulatus*, wavy leaved aster, found in dry open woods and clearings.

*Clitoria mariana*, Maryland butterfly pea, found in dry upland woodlands and barrens.

*Desmodium viridiflorum*, velvety tick trefoil, found in dry woods.

*Lilium superbum*, Turk's cap lily, found in wet meadows and low areas.

*Solidago hispida*, hairy goldenrod, found in open rocky places.

*Spiranthes ovalis*, lesser ladies' tresses, found in moist woodlands and bottomlands but also in old fields and pastures.

*Spiranthes tuberosa*, little ladies' tresses, found on dry soils.

The water hyssop is particularly rare. It is associated with ponds in karst areas and could migrate to similar environments in the surrounding landscape. The plant will become an FSOC when the list updating is complete. It has been found in Georgia Pond and may exist in similar ponds on nearby private lands. This plant exists in shallow water habitats in karst areas and is favored by Georgia Pond's current condition (Ref: Gleason and Cronquist, Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 1991) The pond is partially breached and is maintaining a low-water level.

## Aquatic Resources

The water resources in the area are mostly subterranean, associated with karst systems. An inventory of the biological component of that system has only recently begun. Although there is no extensive riverine or wetland system in the Tincher area, it is important to note the connection between the karst water system and surface hydrology. Water draining into the karst system has been traced to surface rises some miles outside of the current (but within the proposed) Special Area boundary.

There are three constructed ponds in the Tincher area which provide recreational fisheries. The Tincher Pond formerly provided good fishing for bluegill, largemouth bass and channel catfish. Rehabilitation is needed to control the extensive growth of aquatic vegetation which now impairs the fishery at this pond.

A second pond was recently acquired by the Forest Service on the new Berry Tract. It is known to contain bluegill and bass but the quality of the fishery is not known. The third pond (Georgia) appears to be providing some fishing but little is known about its quality.

## Soils

There are two predominant soil complexes in the Tincher Karst Special Area, the Wellston-Gilpin Complex and the Ebal-Hosmer-Crider Complex. The Wellston-Gilpin soils are moderately deep to deep, well drained soils found on moderately sloping to very steep lands. They are medium textured soils that formed in loess and the underlying residuum from sandstone, siltstone or shale in the uplands. Where these soils are found on steeper slopes, they are subject to erosion problems following ground disturbing activities. Most of these areas are in woodlands or pasture as they are generally unsuitable for farming or development. About 80 percent of the Tincher Area contains these soils. (Reference: USDA - SCS, 1985 "Soil Survey of Lawrence County, Indiana")

The Ebal-Hosmer-Crider soils are deep, well drained soils on gentle to moderately sloping lands. They are medium textured soils formed in loess deposits or in loess or colluvium and the underlying residuum from sandstone, limestone, or shale on the uplands. Depending on slope, these soils are often used for farming or pasture. The soil survey recommends applying conservation practices to slow erosion of the soils.

Both soil complexes are well suited to growing trees. Management activities that could cause erosion would require mitigation, particularly on steep slopes, to minimize erosion impacts.

This Special Area boundary encompasses at least five ecological landtypes (ELTs) that occur in the Crawford upland subsection and the Crawford escarpment subsection (with ELT 3: cliffs the only possible exception). The *Field Guide for the Ecological Classification of the Hoosier Natural Forest and Surrounding Areas of Indiana* (Van Kley, Parker et al, 1994) describes the ELTs and is available at the Brownstown Ranger District office. It is incorporated herein by reference.

The ELTs in the Special Area and the basic types of soils that occur on those ELTs are described below.

**ELT 1: Dry Ridges.** Slope gradients range from 4 to 12 percent. The narrower ridges are included in the Wellston-Gilpin silt loams (WgD2) soil map unit and the Gilpin-Weikert-Wellston complex (GwF). These narrow ridges may only be wide enough for a trail or a single lane woods road. Management concerns include their narrowness and the associated nose slopes and side slopes.

**ELT 2: Dry Slopes.** These include aspects generally south (135-315 degrees azimuth). Slope gradients range from 10 to 50 percent. The Ebal-Wellston silt loams (EdD) occur on benched side slopes. The Ebal soils occur on the benches and these soils are severely limited for most recreation uses because of the shrinking and swelling of the soils. The Wellston soils occur between the benches and these are severely rated mainly because of slope gradient.

Management concerns for the Ebal soils are the shrinking and swelling, the slow permeability, and water table depth.

The Wellston-Gilpin soil complex (WgD2, WfD3) occurs on the unbenched 10 to 18 percent slopes. These soils have lost 25 to 75 percent, 2 to 8 inches, of the A and E horizons due to intensive agricultural cultivation or pasturing prior to FS acquisition. Some of the cultivated areas were planted in white pines to protect the soil and begin the soil restoration process. These soils are well drained. Rapid runoff and severe erosion hazard are the main management concerns. Conscientious trail location, alignment and proper use of drainage facilities will overcome most severe limitations.

The Gilpin-Weikert-Wellston complex occurs on the 18 to 50 percent slopes. The soils on these slope gradients have little or no erosion because they are too steep to cultivate or pasture. These soils are well drained. Rapid runoff and severe erosion hazard are the main management concerns. Conscientious trail location, alignment and proper use of drainage facilities will overcome most severe limitations.

ELT 4: Mesic Ridges. Slope gradients range from 2 to 12 percent. Hosmer silt loam soils (HxB2) and Wellston silt loams (WeC2) occur on the broader ridges. The soils have lost 25 to 75 percent, 2 to 8 inches, of the A and E horizons due to intensive agricultural cultivation prior to FS acquisition. Some of these areas were planted in pine or hardwoods, other areas were allowed to revegetate naturally to protect the soil from further erosion and to begin the soil restoration process. A fragipan in HxB2 soil map unit causes a perched water table at a depth of 30 to 36 inches from March to April and tends to be droughty in late summer.

ELT 5: Mesic Slopes. These include aspects generally north (315-135 degrees azimuth). Slope gradients range from 10 to 50 percent. The Ebal-Wellston silt loams (EdD) occur on benched side slopes. The Ebal soils are found on the benches and these soils are severely limited because of the shrinking and swelling of the soils. The water table is at a depth of 3 to 6 feet from November to March. The Wellston soils occur between the benches and these are severely rated mainly because of slope gradient. Management concerns for the Ebal soils are the shrinking and swelling, the slow permeability, and water table depth.

The Wellston-Gilpin soil complex (WgD2, WfD3) occurs on the unbenched 10 to 18 percent slopes. These soils have lost 25 to 75 percent, 2 to 8 inches, of the A and E horizons due to intensive agricultural cultivation or pasturing prior to FS acquisition. Some of the cultivated areas were planted in white pines to protect the soil and begin the soil restoration process. These soils are well drained. Rapid runoff and severe erosion hazard are the main management concerns. Conscientious trail location, alignment and proper use of drainage facilities will overcome most severe limitations.

The Gilpin-Weikert-Wellston complex occurs on the 18 to 50 percent slopes. The soils on these slope gradients have little or no erosion because they are too steep to cultivate or pasture. These soils are well drained. Rapid runoff and severe erosion hazard are the main management concerns. Conscientious trail location, alignment and proper use of drainage facilities will overcome most severe limitations.

ELT 6: Bottomlands. These include bottomland positions along minor streams in the Special Area. Slope gradients range from 0 to 2 percent. The Burnside soils (Bu) and Haymond soils (Ho) occur along the streams in the project area. The Burnside soils formed in loamy and silty alluvium. The Haymond soils formed in silty alluvium derived from loess covered uplands.

The Burnside soils have more sand throughout the profile than do the Haymond soils. Some of the bottomlands in the project area were cleared and farmed prior to FS acquisition. Most of the streams and drainages are typical of karst topography in that they disappear into sinkholes. Haymond soils (Ho) have a frequent flooding hazard for brief periods from January to May and Burnside soils (Bu) have a frequent flooding hazard from March to June. Management concerns are the flooding hazard and wetness.

(Reference: USDA - SCS, 1985 "Soil Survey of Lawrence County, Indiana")

## **HERITAGE**

Within the Special Area, 40 acres have been surveyed for heritage resources. Six sites have been formally recorded while an additional eleven sites are known to exist but are unrecorded. Recorded site types include two prehistoric open sites, one historic farmstead and three sites of unknown origin. Reported within the Special Area is a prehistoric rockshelter, a kaolin clay mine, four homesites, an historic site within a cave, a small African-American settlement, two cemeteries, the Georgia Fire Tower site and the Gardner Mine. One open hazardous well has been identified in the area, at the Tinchner mine site.

At Gardner Mine, endellite was discovered in 1874 while mining for iron ore to fuel the Shoals Furnace. This clay substance was used as a component of white porcelain ware, as a filler for paper and rubber products, and for use in alum (particularly for water filtering). Mining continued until approximately 1891.

The Georgia Fire Lookout Tower was built in the 1930's by the CCC and dismantled in the early 1970's. It was 'manned' by Clarisse Carroll from 1950-1970. She has been interviewed by the Forest Service and the transcripts are on file.

None of these properties have been formally evaluated for significance according to the National Register of Historic Places criteria. This area is thought to have low to medium potential for the occurrence of heritage resources. The caves in the area do have the potential to yield both prehistoric and historic resources.

Early aerial photographs indicate many of the ridgetops were farmed in the late 1930's. The Gardner mine and many houses and barns are also visible.

Outside the current boundary, but within the proposed boundary, is the Williams covered bridge. This National Register listed structure, built in 1884, is the longest covered bridge still used by vehicles in the State of Indiana.

## **VISUAL RESOURCE**

The characteristic landscape is a mixture of natural and human-influenced elements. Tree-covered hills of oak, hickory, maple and many other species provide a pleasant backdrop to farms and other private inholdings. Karst features and rock outcrops are evident throughout the area and add interest and variety to the landscape. Timber harvest is evident on the forest land but most clear cuts are at least eight years old and are in the thick sapling stage of succession. Most harvest areas are blending in with the natural landscape. Power line rights-of-way cut through the area leaving cleared areas which appear unnatural. In some areas, large diameter trees can be found along with park-like conditions.

Ponds and forest openings create visual interest and provide contrast to the surrounding wooded areas.

Old barns, pastures, crops and livestock provide scenes that many people find attractive and add variety to the landscape. Open spaces are found in the valley and on ridge tops where it is possible to operate equipment. Often these openings provide interesting views and vistas to surrounding landscapes. Many of the roads in the area are driven in the spring and fall to view the flowering trees and outstanding fall color. Detracting from the visual resources are junk cars and trash dumps.

The visual resource management system has been applied to the area and considers scenic quality, viewer sensitivity levels and distance zones. Most of the area is rated as common or "B" scenery. Sensitivity levels along the roads, Tincher Pond, and karst features are rated medium. All other areas have a low sensitivity rating. Most of the area is visible from roads and trails and therefore would be considered in the foreground. All other areas would be middle ground. The visual quality objective along roads is "partial retention." The Fuzzy Hole area is "retention" to protect the visual resources in the karst area. All other areas are "modification."

Following is a brief explanation of the visual quality objectives:

**Retention** - A visual quality objective which in general means management activities are not evident to the casual Forest visitor.

**Partial Retention** - Management activities may be evident but must remain subordinate to the characteristic landscape.

**Modification** - Management activities may dominate the characteristic landscape but must, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

## RECREATION AND INTERPRETATION

Many recreational opportunities, such as hiking, horse riding, hunting, caving, nature study, camping, and gathering forest products, currently take place within this Special Area.

### Fishing

Tincher Pond is the only designated recreation site. Fishing success at the pond is modest at best. It contains channel catfish, blue gill, and large mouth bass. The pond receives a fair amount of use but contains excessive sediment and weeds. Picnic and restroom facilities were removed several years ago, but the parking lot was recently reconditioned. The area needs additional work to appear user friendly, while the pond itself requires rehabilitation to restore its fishery.

Berry Pond has good fishing and dispersed recreation use potential. Georgia Pond has been breached and now serves as a wetland; reconstructing the pond is not cost effective. This pond is also supporting a population of *Bacopa rotundifolia*, a rare plant favored by its current low-water condition, so improvements to provide for recreational fisheries are unlikely.



## Trails

Currently, there are no designated trails within the area. The number of miles of user-made trails from horse and illegal off-road vehicle (ORV) use has increased dramatically within the last five years.

## Driving for Pleasure

Paved County roads #126, #22, and #16, located in the north half of the Tincher Valley portion of the Special Area receive considerable use by visitors driving for pleasure and sightseeing. The Tincher Valley Ridge Road is on the Lawrence County auto tour route with Gardner Mine listed as an interpreted site. Bicycle rallies and other bicycle use occurs on County Road #22.

## Other Recreational Activities

Other dispersed recreational activities include deer, turkey, and squirrel hunting, mushroom hunting, gathering forest products, horse riding, hiking, mountain biking, and illegal ORV riding. Deer and turkey hunting is extremely popular and accounts for most roadside camping. Gory Hole and Fuzzy Hole are visited frequently by cavers; other caves on Forest lands are visited occasionally. Parking areas for access are limited.

## LANDBASE

### Roads

Highway 50 bisects the area and is a well maintained federal highway with passing lanes and shoulders. Indiana Highway 60 borders the southern boundary and is a two-lane paved highway. The remaining roads, maintained by Lawrence County, are narrow two-lane gravel and asphalt roads. There are approximately nine miles of highway and 15 miles of county roads within the Special Area. There are several old roads that are not maintained. Some of these roads are rutted by ORVs. The road south of the White River is often used for road rallies and bicycle tours.

Forest Service maintains some travelways to access permanent forest openings for maintenance. These travelways are unsurfaced and are used approximately every three years by Forest Service personnel. Some unauthorized use occurs on these travelways by ORVs and trucks.

The Indiana Department of Transportation (INDOT) has purchased land for future realignment of Highway 50 which includes the entrance to Hoosier National Forest Swallow Hole Cave which runs under NFS lands.

### Facilities

There are very few facilities in the Special Area on NFS land. The most noticeable is the Georgia Radio Tower which is 80 feet tall and can be seen from vantage points within and out of the area. The tower is owned by the Indiana State Police and is under permit, it provides communications for the Forest Service, Federal Bureau of Investigation, and Indiana State Police. There is a small building at the base of the tower to house radio equipment. There are several

small ponds in the area. Some were created for wildlife watering while others are large enough to support some fisheries. The most notable pond is the two-acre Tincher Pond which has a five-car parking lot and trail to the pond. Several two to three-car parking lots are scattered around the area to provide dispersed access for Forest visitors.

## **HUMAN AND COMMUNITY DEVELOPMENT**

This rural area provides housing and small tracts for people working in Bedford and at the Crane Naval Base. Lawrence County is the leading beef cattle producer in the State of Indiana. The rural towns of Huron and Williams are located just outside the current Special Area boundary and provide gas stations, post offices and grocery services. Summer cabins are also located along the White River just outside the boundary.

This area is not considered suitable for timber harvest unless timber management practices are necessary to maintain the unique geologic character or are associated with ongoing research. Surface-disturbing mineral activities are not considered compatible with the objectives of this Special Area and are not allowed.

Special use applications which do not threaten the area's unique character are allowed. A special use permit is issued to Indiana State Police to build and operate a microwave relay tower and associated 8' x 12' metal equipment shed. South Lawrence Utilities has a permit for a 6" water transmission line paralleling Highway 50 for approximately one mile on NFS land. Permits are issued to Davies-Martin REMC for buried power lines accessing the Berry Tract and the microwave tower (a total of approximately 3/4 mile).

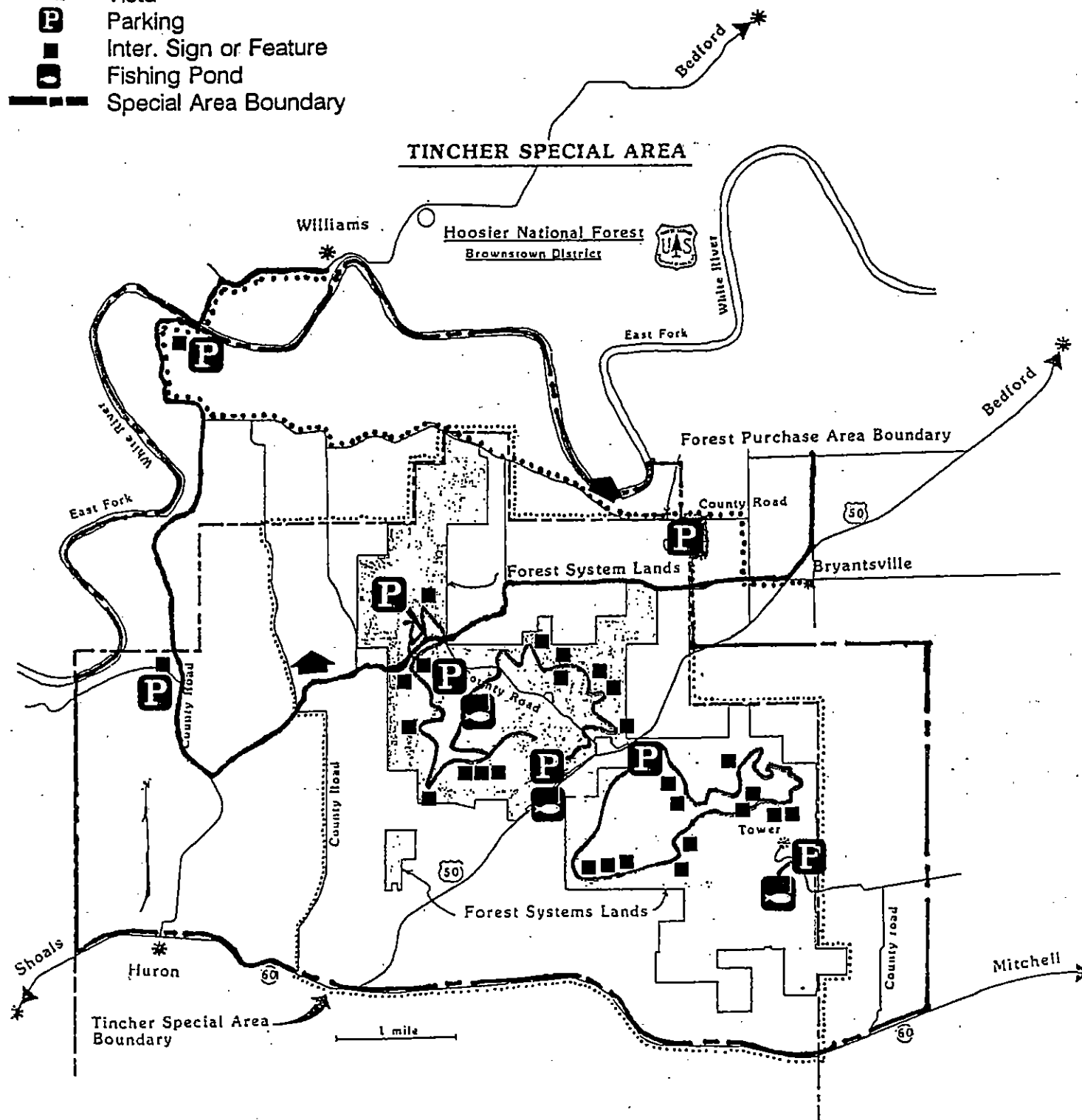
Currently plant collecting permits are not issued in this area. The collection of forest products such as firewood, ginseng, grapevines, and mushrooms is prohibited.

An auto tour has been developed by the Lawrence County Tourism Commission which identifies various cultural and natural features of the area.

Three modern trash dumps have been identified in the area, although many more may exist.

# LEGEND

- Lawrence Co. Auto Tour Route
- ..... Road Rally/Bike Route
- Hiking Trail
- ▲ Vista
- P Parking
- Inter. Sign or Feature
- Fishing Pond
- - - Special Area Boundary



## MASTER PLAN



## **DESIRED FUTURE CONDITION**

This section describes the goals and objectives for this Special Area as if it were in its desired future condition. This is the vision of how the area will become if all the opportunities are realized and the management practices are implemented.

### **ESTABLISHMENT INTENT**

The Tinscher Karst Special Area was established in April 1991 by the Hoosier National Forest Land and Resource Management Plan Amendment (Appendix O, Page 5). The area was designated a Special Area to highlight and protect the karst geology and associated values. Primary among those values are the unique geologic, hydrologic, biologic, historic, and recreational features and opportunities in their natural setting.

### **DESIRED CONDITION**

The desired condition of this area includes the following:

#### **Karst Features**

The physical structure, geology, hydrologic processes, biota and heritage features of the karst system have been surveyed and mapped. Boundaries of this Special Area have been expanded to incorporate more of the regionally significant karst features. (See proposed boundary map in management section.) Cave exploration is occurring at moderate levels and provides recreational opportunities while adding to the knowledge of the karst system. Cave groups are working cooperatively with the Forest Service to map and inventory the karst features. This activity does not harm the caves and karst ecosystem. Forest Service policies permit use of caves but do not encourage overuse. Each known cave has an individual cave management plan which prescribes its protection and use. Karst valleys and basins are protected from ground disturbing activities.

Caves and karst hydrologic systems which were choked by debris or sediment, resulting from human activity, have been restored. The hydrologic functions are operating within the range of natural variability.

Sensitive cave ecosystems which depend on stable levels of air, water, detritus, temperature, and humidity levels are maintained in a steady state consistent with the environment in which they developed.

## Facilities and Recreation

Recreational and interpretive facilities are in place which promote understanding and conservation of the karst features and their associated values and uses. The road system includes only those needed to facilitate management and use consistent with the Special Area plan. Unwanted roads have been closed. Along with these roads, trash dumps, portable sawmill sites and eroded areas have been rehabilitated to blend with the surrounding woodlands.

The use of the area is facilitated by adequate, safe, and dispersed parking lots. Facilities provide for both environmental protection and human safety at Gory Hole.

Fish populations thrive in Tincher and Berry Ponds and provide quality fishing experiences.

## Vegetation Conditions and Management

The area is set aside for development of "old-growth," is dominated by native hardwoods, and is developing toward late seral conditions through forest succession. Human-caused disturbances are minimized but trees are removed for the creation of vistas, parking areas, and other projects designed for visitor safety and enjoyment. Mature forest surrounds the "old-growth" core area providing habitat for interior forest associates.

Hydrologic features including those related to karst systems are buffered by native vegetation. Streams, drainages, swallow holes and rises are surrounded by mature forest which neutralizes climatic shifts and filters sediment.

Threatened, endangered and sensitive species, and FSOC thrive in their habitats and are maintained by management activities, if necessary. Georgia Pond continues to support a flourishing population of *Bacopa rotundifolia* which functions as a potential source area for reintroduction to other similar habitats in the surrounding landscape.

Protection of the karst features takes precedence over other values in planning and implementation of management activities.

Exotic pines are removed when necessary to maintain populations of threatened, endangered or sensitive species and FSOC but are otherwise left to provide recreational value. These values are considered to exceed the ecologic value of replacing them with native species.

Karst ponds or other suitable habitat for roundleaf water hyssop are maintained and new populations are established through natural vectors.

Openings are maintained at current levels within the special area boundary. New openings will not be added to the openings maintenance program unless needed to maintain rare plant populations or communities.

## Soils

Soil erosion and sedimentation occur at rates within the range of pre-historic variability. The karst system is able to process sediment inputs without becoming choked and flushes them out periodically to maintain open passages.

## **Visual Resources**

The entire Special Area meets "retention" visual quality objectives. Vistas are created, protected or enhanced by management activities.

## **Heritage Resources**

The entire area has been surveyed for heritage resources. Significant sites have been identified, evaluated, protected and interpreted where desired. Gardner Mine has been evaluated to determine its historical significance. It is managed for human safety and interpretive purposes.

## **Human and Community Development**

Timber harvesting activities which are not necessary to maintain the unique geologic or ecologic character of the area or do not support recreation developments such as vistas or parking areas do not occur.

Miscellaneous forest products such as firewood, ginseng, grapevine and mushrooms may be collected upon issuance of a plant collection permit.

The area is free of trash dumps.

# MANAGEMENT PRACTICES

This section identifies the actions and opportunities that when executed will move the Special Area toward the desired future condition. Collectively these management practices define the operating space within which this area will be managed.

The Tincher Karst Special Area shall be managed in a near natural condition with minimal manipulative disturbance. Emphasis is on preservation of the karst environment and conservation of the biological resources. Recreation at the primitive end of the spectrum and recreation geared to protection through interpretation of karst resources are emphasized. Responsible scientific studies are encouraged.

Extending the Special Area boundary would allow it to encompass the assumed karst hydrological and biological ecosystem. This will include the interconnected surface and subsurface drainage basins north to the White River and rises at Blind Fish Spring and Hooper Spring. It also includes a potential Special Area candidate at Henshaw Bend.

This extension will remove some 365 acres (about 0.4%) from Management Area 2.8. Vegetative management activities on those acres will be limited to those compatible with the guidelines for this Special Area. There will be no programmed timber harvest or creation of new openings in the area. Existing openings will continue to be maintained. There are 2 openings (2 acres each) on these 365 acres.

## ECOSYSTEMS

Manage the timber resource only as needed to maintain unique native plant communities or to sustain or promote populations of threatened, endangered or sensitive species and FSOC.

Retain exotic pines for their recreational value, removing them only when necessary to protect the unique ecologic or geologic features of the area.

Sawmill sites should be rehabilitated and revegetated to blend with the surrounding landscape and vegetation. (See map for locations.)

Encourage scientific study and exploration of the area with appropriate resource protection measures determined on a case-by-case basis.

Manage federally-listed threatened and endangered species, regional sensitive species and FSOC as necessary.

Prescribed fire may be used to protect or enhance populations of federally-listed threatened and endangered species, Regional sensitive species and FSOC or unique natural plant and animal communities.

In wildfire suppression, emphasize protecting vegetative buffers around important karst and cave features.

Fisheries or other aquatic resources may be enhanced if appropriate mitigation is in place to protect important karst features.



## **KARST**

Encourage a systematic inventory and exploration of the cave and karst features to discover locations and other karst values in order to evaluate and protect cave and karst resources, including microscopic cave life and paleo-sedimentation (see FLMP 2-10 and Appendix I).

Permits may be issued to speleologists and cavers, on a case-by-case basis, to conduct scientific research and exploration by small scale excavations to discover new information regarding the extent and nature of the karst resource.

Prohibit activities that could negatively impact caves, karst features, or the subterranean hydrologic systems.

Prohibit or mitigate the use of fire, chemicals and ground disturbing management activities that have the potential to impact karst resources.

Caves and karst hydrologic systems which are found to be choked by debris (other than what would occur naturally) may be cleared.

Protect delicate cave environments by maintaining or restoring to normal levels: detritus, groundwater quality, sedimentation, air/water temperature, humidity and air flow.

## **HERITAGE**

Adhere to requirements of the Antiquities Act, Executive Order 11593, the National Historic Preservation Act and its implementing regulations 36 CFR 800, The Archaeological Resources Protection Act of 1979 as amended, and FSH 2309.24.

Protect valuable paleontological resources (natural history evidence), such as stratified sediments or fossils, found in caves from disturbance (Federal Cave Resources Protection Act of 1988).

## **VISUAL RESOURCE**

As feasible, vistas may be constructed and maintained along trails and roads.

## **RECREATION AND INTERPRETATION**

Horse trails are not permitted within this Special Area.

Special Use trails are not allowed.

## **LANDBASE**

### **Roads**

No additional interior roads will be constructed.

### **Land Acquisition, Ownership and Adjustment**

Adjust the Special Area boundary to include more of the karst features such as Blind Fish and Hooper Springs (See master plan map).

Acquire properties with karst features on a willing-seller basis.

### **Facilities**

Small (2-5 car) parking lots may be constructed to provide better access to the Forest.

## **HUMAN AND COMMUNITY DEVELOPMENT**

Control illegal ORV and horse use through systematic law enforcement patrols, road closures and vacatings.

Increase tourism and revenue to the local economy through development of dispersed recreation and interpretive opportunities.

Allow collection of forest products such as firewood, mushrooms, ginseng, and grapevine through issuance of collection permits.

# MONITORING AND PROJECTS

## PROJECTS

These are possible projects which meet the intent of this plan and the Forest Plan. Many of these projects require analysis and documentation under NEPA and are dependant on budget and partnerships to complete.

- \* Complete individual cave management plans, including monitoring plans.
- \* Conduct surveys for cave and karst values.
- \* Contract a Geological/hydrological overview.
- \* Eliminate user-made trails by physical closure and rehabilitation.
- \* Provide land line surveys where needed to prevent trespass and theft.
- \* Close unneeded roads with barrier posts and gate all other roads with standard gate (see map). Pursue vacating of county roads that are no longer needed (see map).
- \* Erect a fence, with warning signs, around Gory Hole to reduce the liability risk. Identify high-risk shafts or adits at Gardner Mine and develop ways to reduce or eliminate the potential safety hazards while preserving the integrity of the resources.
- \* Construct a 14-mile hiking trail for the purpose of interpreting the karst, biological, and historical features of the area and to teach a conservation ethic (see master map). Include small loops for intermediate users. Construct the trail to a difficulty level of moderate to easy and a moderate construction standard. The trail should average no more than three feet wide and may be graveled. Slopes would be gentle (8 percent or less). This trail would only be constructed at such time as adequate techniques, funds, support and resources are available to insure that no harm will be caused to the karst resources and surrounding values.
- \* Enhance fishing opportunities at Berry and Tincher lakes
- \* Construct ten parking areas (2 to 5 cars)
- \* Evaluate Gardner Mine to determine eligibility to the National Register of Historic Places
- \* Clean up dump sites.
- \* Construct vistas along Tincher Ridge road.

- \* Install a standard parking sign at each location (see master plan map).
- \* Rehabilitate sawmill sites (3)
- \* Amend HNF LRMP to enlarge Tincher SA boundaries to encompass regionally significant karst features including Blind Fish and Hooper Springs and associated subterranean/surface drainage basins (see map), and change the name to Tincher Karst Special Area.
- \* Construct a parking area, traffic control fence, and additional signs at Gory Hole to provide for visitor safety, for interpretation of the site, and for environmental protection if monitoring indicates a need.
- \* Inventory for heritage resources.
- \* Conduct a literature search, do field explorations and write a thorough geological/hydrological overview of the Special Area.
- \* Attempt to locate karst features which have an associated archaeological site.
- \* Conduct a paleo-environmental reconstruction by coring or otherwise sampling sediment found within karst features.
- \* Place an Interpretive sign at the old Georgia Fire Tower.
- \* Clean up Berry tract, close the drive with barrier posts, but maintain a parking area to accommodate up to six vehicles for walk-in access.
- \* Maintain Berry pond as a dispersed recreation pond and maintain a quality fishery. Maintain dam and outlet structures.
- \* Maintain the water level at Georgia pond at an appropriate level to allow the water hyssop to flourish.
- \* Coordinate with INDOT to ensure that new Highway 50 will not damage the HNF cave.
- \* Maintain road to Tincher cemetery to accommodate sedans.

## **MONITORING**

Site visit every 3-5 years to determine condition of *Bacopa rotundifolia* population in Georgia Pond.

Complete rare plant inventories and create GIS layer and database of known populations.

Revisit site containing early seral rare plants to monitor effects of forest development (succession) on population vigor and mortality. (Every 5 years after initial inventory is complete.)

Insure each individual cave management plan includes a monitoring plan.

Monitor to determine impact of visitors to the Gory Hole site.

Monitor to insure protection of karst features.



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# **TINCHER KARST SPECIAL AREA**

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**Writer - Editor**



# **APPENDICES**

## **Appendix 1**

### **TINCHER BOUNDARY MAPS**

**MAP A - M.A. 8.2 BOUNDARY FOR TINCHER KARST SPECIAL AREA**

**MAP B - DESIRED BOUNDARY FOR TINCHER KARST SPECIAL AREA**

## **Appendix 2**

**KARST FEATURES IN THE TINCHER KARST SPECIAL AREA**

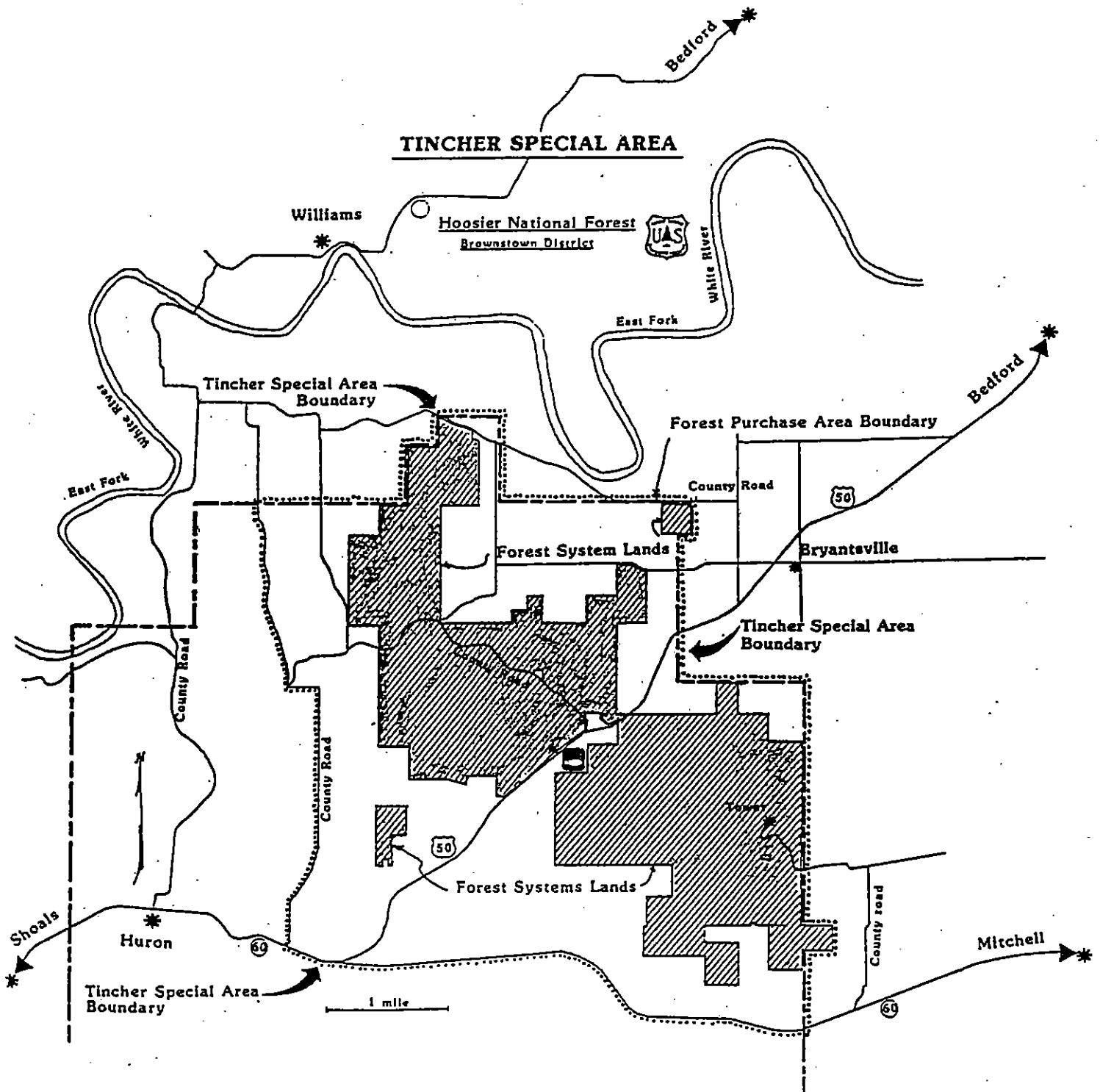
## **Appendix 3**

**KARST SURFACE FEATURE GLOSSARY**



# Map A

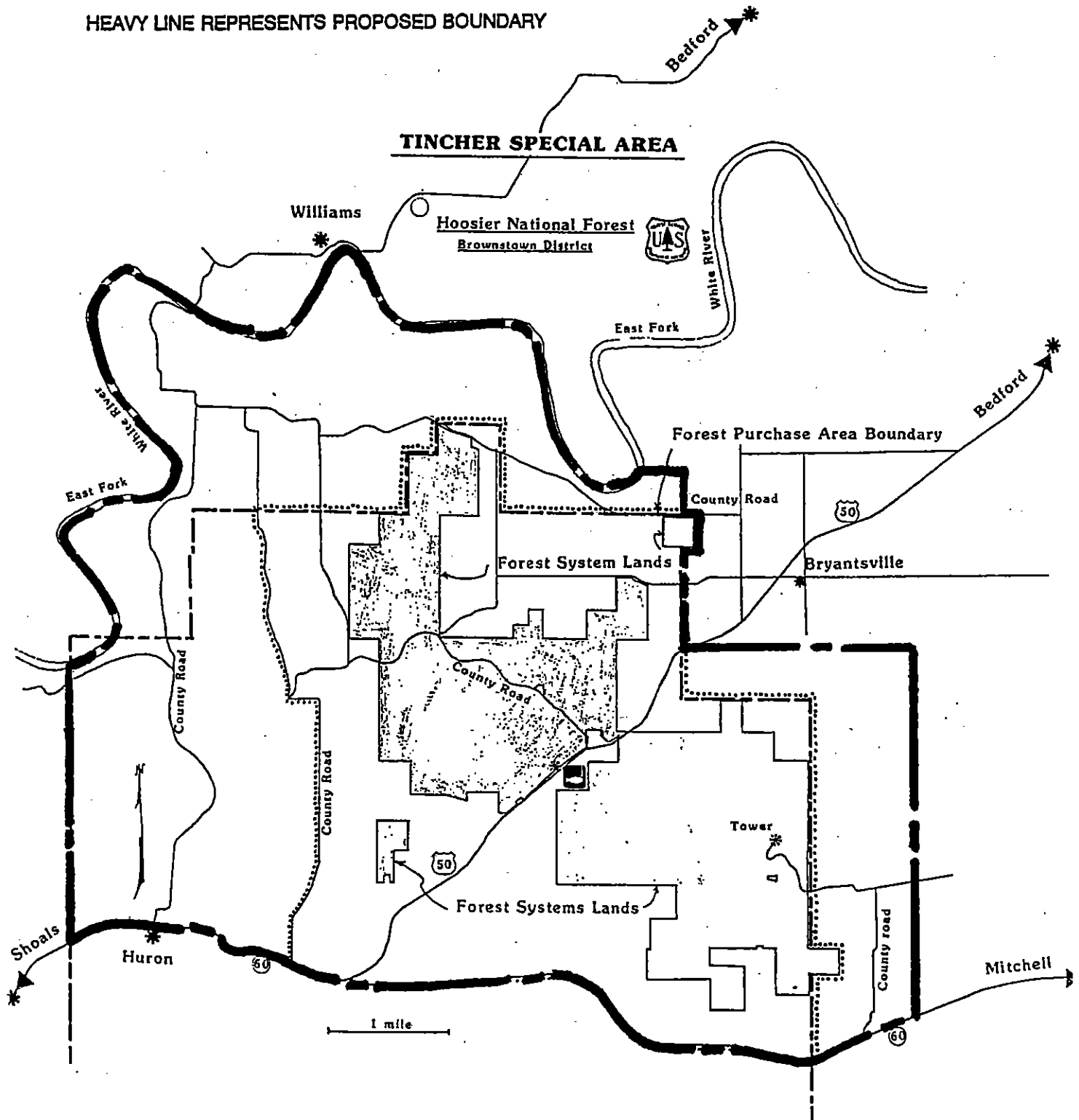
## Existing OA Boundaries



# Map B

## Proposed Boundaries

HEAVY LINE REPRESENTS PROPOSED BOUNDARY



## APPENDIX 2

### HOOSIER NATIONAL FOREST - TINCHER KARST SPECIAL AREA Listing of significant caves and karst features within the proposed boundary

(Includes both public and private lands)

27 August 93

Point:	Name:	Description:
01	HNF Swallow Hole	45 ft. pit with multi-level cave system below. see cave files.
02	Fuzzy Hole	Large collapsed sink hole / dome. see cave files.
03	J. J. Cave	Cave entrance in south rim of a large rocky sinkhole. see cave files.
04	J. J.'s Sister Cave*	Located on the north rim of the same sink. Small new cave.
05	Bit Cave*	A climb down into a small one room cave. Hillside entrance. 26 ft. depth
06	Brick Pit*	A well developed 45 ft. pit with no known connecting passage.
07	Pail Cave*	Small cave located in a large abandoned swallow. A tight crawl leads to one room. 60 ft. (est.) horizontal extent.
08	Dogleash Cave*	Located in a large abandoned swallow.
09	Crystal Falls Cave	See cave files for map and description.
10	HNF Trapdoor Pit*	30 ft. pit. No cave passage.
11	Four In Pit*	36 ft. pit.
12	TRAC Cave	See cave files.
13	William's Cave (crack cave)	See cave files.
14	Triple Sinks*	A small spring runs into one sink, running water can be heard at the bottom of a second large sink and the third sink is dry.
15	Tincher Sr. Cave*	Large sinkhole entrance in limestone. Walking passage < 100 ft.
16	Tincher Jr. Cave*	A climbdown at the bottom of a sinkhole leads to two small rooms.
17	Smith Folley (smokey hole*)	Located downhill from Fuzzy Hole. Only large enough for one person.
18	Hairpin Swallow*	Not indicated on topo but it is a significant swallow hole.
19	Box Pit	Adjacent to a small quarry. An adjacent cave in the quarry may have been filled in. Some confusion exists here.
20	Collapse Pit Cave	Has been covered with rock fill. Refer to ICS records.
21	All Day Cave	A 130 ft. horizontal cave with very limited access.
22	All Night Pit (doggone pit)	25 ft. pit. Bells out into a few small side domes. No going passage.

23	Fire House Pit*	33 ft. pit. Not associated with any sinkhole or limestone contact.
24	Formation Cave	Sizable entrance on bluff. Ends in one room where many formations have been vandalized.
25	Formation Pit*	A 32 ft. pit with lots of flowstone covering the walls.
26	Beeman Collapse*	The collapse of a large cave passage. No accessible leads.
28	Lost Lamp Pit Cave	Filled in with concrete tailings. ICS records exist.
29	Hope Spring (echo hole)*	Abandoned spring exit. Sandstone contact. Not enterable.
30	Laura Lee's Cave*	Small cave, not mapped. Large breakdown inside, considered dangerous.
31	Gory Hole	Longest rope drop in Indiana. See cave files.
32	Burton Hollow Cave*	Est. 120 ft. horizontal. Fragile formations, may flood occasionally.
33	Two Stream Swallow*	Two small streams meet and sink at the base of a limestone contact.
34	Hidden Domes Pit	See cave files.
35	Easy Out Cave*	Located in a dry stream bed. 10 ft. vertical entrance. Small cave.
36	Turtle Plunge	See cave files.
37	Notch Cave*	Small tight vertical entrance. Small cave.
38	Convention Cave	See cave files.
39	Tincher Hollow Cave	See cave files.
40	Horse Bone Hole	See cave files.
41	Tincher Swallowhole	See cave files.
42	Burton Swallowhole*	50 ft. deep depression. Small cave may wash open from time to time.
43	Sally Swallow Cave*	In dry stream bed NE of Sally Hill. 182 ft. horizontal.
44	Horseshoe Springs*	Multiple large springs. Resurgence of a presumed vast cave system.
45	Hillside Spring & Swallow*	A spring runs over ground for 100 ft. and sinks into a rocky depression.
46	Small Karst Window*	The collapse of a small stream passage.
47	Three Swallows*	Three distinct large swallow holes. No accessible cave passage.
48	Garden Hose Pit*	See cave files. No connecting cave passages.
49	Firestone Hole*	A small stream swallows here. Good site for a dye trace in wet weather.

\* Reference H. Geick

NOTE: "small cave" indicates those caves with < 25 ft. vertical and / or < 75 ft. horizontal dimensions.

## APPENDIX 3

### KARST (SURFACE) FEATURE GLOSSARY

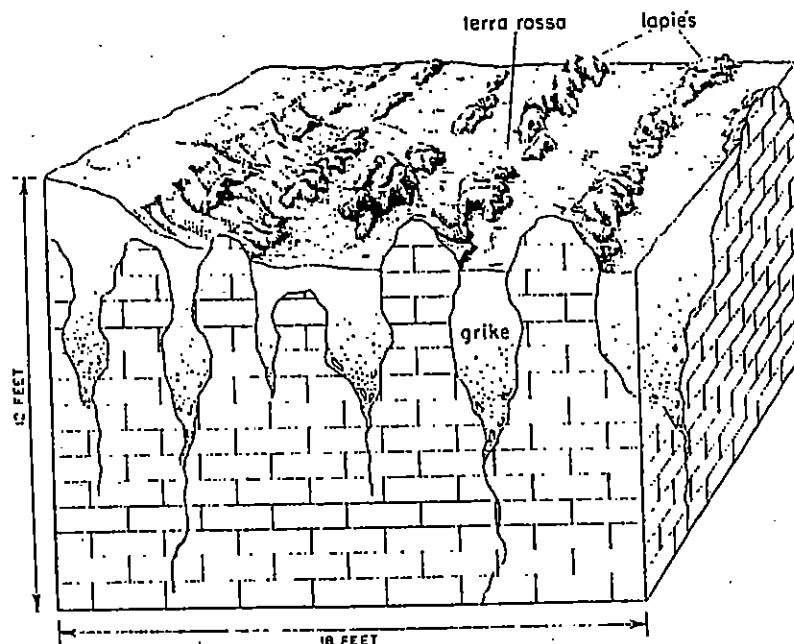
**Blind Valley** - where a sinking creek has terminated at a swallow hole for so long that it has cut its valley upstream from its sink so much below the level of the karst plain that the valley ends at the swallow hole (Thornbury, 1954), e.g.; Burton Hollow.

**Drybed** - a surface channel that is dry except after heavy rains when the swallow hole cannot collect all of the water and thus allows water to remain as surface drainage. A drybed may have many swallow holes along its course (Mallott, 1945), e.g.; Burton Hollow.

**Gulf or EuValla** - a large collapse sinkhole that has steep walls and a rocky floor (Malott, 1932), e.g.; Wesley Chapel Gulf.

**Grikes** - Joints in near surface limestone widened by solution (Malott, 1945, p. 10) {Illustration 1}

Diagram showing the structure of lapies and grikes.



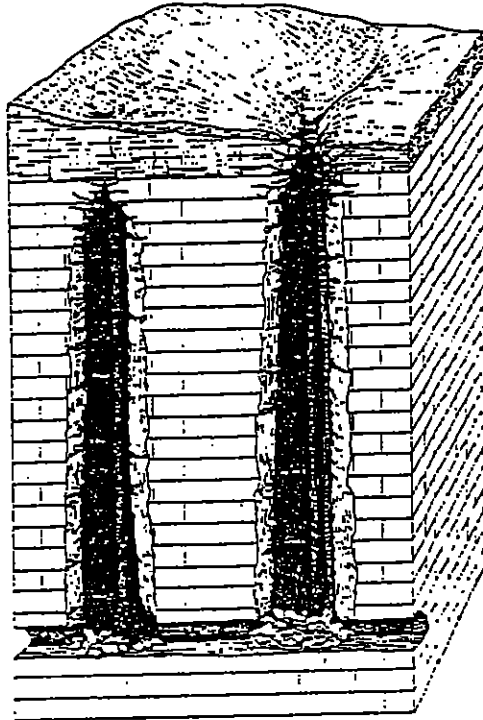
**Karst swamp** - shallow sinkhole that supports a swampy vegetation (Powell, 1961). No permanent examples on Forest lands in Tincher Special area.

**Karst Window** - a type of collapse sinkhole caused by the failure of a cavern roof over a horizontal subterranean passage (Powell, 1961), e.g.; Double Sinks Pit.

**Lapies** - The upward-projecting surfaces of the eroded limestone that appear on the surface to be field stones {Illustration 1}.

Pit, shaft - a type of sinkhole, where the surface has collapsed, or eroded, into an underlying dome (Powell, 1961), e.g.; Gory Hole.

Diagram showing  
pits and domes  
(approx. 80' high)



Rise or Karst spring - Underground streams may flow for many miles through subterranean passages. The emergence of an underground stream may be called a "rise," a "spring," or a "karst spring." (Malott, 1945) e.g.; Blind Fish Spring.

Rise Pit - the pit from which a spring rises is called a "rise pit" e.g. Hooper spring.

Sinkholes - sinkholes formed by the solution of limestones near the surface that results in a gentle depression containing terra rosa are called "dolines". Sinkholes with steep sides resulting from the collapse of the roof of an underlying cave are called "collapse sinkholes" (Malott, 1945, p. 10) e.g.; Fuzzy Hole.

Sinkhole Plain - a small area where there are many sinkholes (Powell, 1961), e.g.; Tincher Valley.

Sinkhole pond - sinkholes that become plugged with in-washed rocks and mud and hold water above the water table, or "karst lakes" (Thornebury, 1954, p. 323). No permanent examples on Forest lands in Tincher Karst Special Area.

Sinking Stream - streams that flow across the surface for only a short distance before sinking or entering a subterranean channel (Thornebury, 1954), e.g.; Tincher Pond drainage.

Solution Valley or Karst Valley - as exhibited in the Crawford Upland; Karst valleys are isolated karst areas which are surrounded by rocks other than limestone. Small sinkhole plains may exist in Karst Valleys (Wayne, 1950). Most streams entering or originating in a karst valley leave the valley as underground streams (Malott, 1921) e.g.; Tincher Valley.



**Spring Alcoves** - Some underground streams return to the surface as springs. These valleys are called "spring alcoves." e.g. Hooper spring. When the head of the valley emerges from the base of a cliff, the valley is called a "steephead", e.g.; Horseshoe Bend springs (Wayne 1950).

**Storm-water Rises** - rises activated only during time of flood. (Malott, 1945). No permanent examples on Forest lands in Tincher Karst Special Area.

**Swallow Hole** - the sink where a sinking stream terminates (Thornbury, 1954), e.g.; Tincher Swallow-hole.

**Terra Rossa** - red clayey soil formed by the disintegration of limestone by solutional processes (Thornbury, 1954, p. 319) {illustration 1}

Idealized drawing of various types of speleothems.

- A - Stalactites
- B - Straw stalactites
- C - Stalagmites
- D - Stalacto-stalagmite
- E - Tiered stalagmite
- F - Draperies
- G - Rimstone
- H - Breakdown
- I - Flowstone

